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How manual therapy provided a gateway to a biopsychosocial management approach in an adult with chronic post-surgical low back pain: a case report

David Toomey[a,b], Duncan Reid[a] and Steven White[a]

[a]Auckland University of Technology, Auckland, New Zealand; [b]Waiheke Physiotherapy and Pilates, Auckland, New Zealand

ABSTRACT

Background: The management of patients with chronic post-surgical low back pain can be very challenging to surgeons, physiotherapists, and patients alike. Subsequent surgery is often associated with post-operative complications and even lower levels of success than the initial spinal surgery. Physiotherapy is often recommended as the first-line management, however, debate exists amongst physiotherapists regarding the optimal treatment strategy. A key focus of this debate has been the use of manual therapy in chronic pain populations, leading clinicians to reevaluate its use.

Case description: A 44-year-old female presented to physiotherapy with a 13-year history of persistent pain, having had a spinal fusion 12 years prior, following a skiing accident. Her primary complaints were pain and decreased self-efficacy. The patient was treated with a 12-week multimodal approach consisting of manual therapy, exercise rehabilitation, and pain neuroscience education.

Outcomes: The patient had a significant reduction in the Numerical Pain Rating Scale (NPRS), the Oswestry Disability Index (ODI) and the Fear Avoidance Belief Questionnaire Physical Activity Subscale (FABQ-PA) scores following the intervention. She returned to running and cycling, reporting that pain was something she would 'work *with* instead of *against*'.

Discussion: This case study suggests that manual therapy can enhance an individualized biopsychosocial approach in the physiotherapy management of a patient with chronic post-surgical low back pain. Further research is needed to evaluate optimal intervention dosages and effective strategies in the management of patients with chronic low back pain following spinal surgery.

KEYWORDS

Chronic pain; manual therapy; pain neuroscience education; exercise rehabilitation; biopsychosocial

Background

The role of surgery for the management of chronic low back pain (CLBP) remains controversial [1]. The current evidence indicates that over 60% of patients experience chronic pain post-operatively and that high levels of patient dissatisfaction are associated with the procedure [2–4]. Despite the lack of evidence to support surgical intervention, the number of spinal fusions performed worldwide is increasing dramatically [5–7].

Whilst some pathoanatomical findings on diagnostic imaging may demonstrate significant associations with low back pain, there is clear evidence that structural changes identified by imaging do not necessarily cause pain or determine the extent of disability of a patient [8,9]. Furthermore, there is growing evidence that a focus on a biomedical cause of low back pain (LBP) can promote fear-avoidance and catastrophizing behaviors in patients with LBP [10,11].

In addition, it has been shown in CLBP patients, that a multimodal approach to rehabilitation that addresses not only the physical, but also cognitive, emotional, social, psychological and lifestyle factors are more effective at reducing pain and disability than usual care or physical treatments alone [12]. Moreover, it has been suggested that physiotherapists are ideally placed and well equipped to work with people suffering from chronic pain using a cognitive behavioral approach, as therapeutic alliance is already established [13,14].

However, there is no clear consensus as to what the constituent elements of the physiotherapy management of post-operative surgical pain should entail [15–18]. Indeed, there is a current debate within the physiotherapy community as how to best manage patients with chronic pain, resulting in polarized opinions regarding treatment approaches. One such recent debate has been the use of manual therapy delivered solely using a biomechanical model, leading clinicians to reevaluate the use, mechanisms and accompanying narratives of these approaches [19,20].

This case study will discuss the physiotherapy management of a 44-year-old woman with chronic post-surgical low back pain using manual therapy, pain

CONTACT David Toomey davidtoomey2@gmail.com Waiheke Physiotherapy and Pilates, Auckland 108, New Zealand

neuroscience education and a progressive exercise program.

Case description

Patient characteristics

A 44-year-old female presented for physiotherapy with a history of CLBP and left anterior thigh pain following lumbar fusion surgery in 2006. The patient reported that her LBP first started as a result of a skiing accident in 2005, some 13 years earlier. Prior to the initial injury, the patient was very active, regularly running and cycling. She was diagnosed with a disc herniation and associated compression of the L5 nerve root, having been referred to an orthopedic surgeon by her general practitioner (GP). She did not have any conservative treatment at this time. In February 2006, she had an L5/S1 fusion with facet screws and an interbody cage. After this operation, she reported that she had ongoing, consistent pain which was the same as her pre-surgery symptoms (see Figure 1). She rated the pain intensity at 4–6 on the NPRS. She also experienced 3–4 exacerbations per year, usually aggravated by bending tasks and prolonged sitting (7–10 NPRS), which typically lasted 2 weeks.

The patient consulted her GP for these flare-ups which were managed with paracetamol, diclofenac and codeine, as well as referral to physiotherapy (massage and a stretching program). She reported this management to be largely ineffective.

In 2015 the patient returned to her surgeon dissatisfied with her ongoing pain and disability. She was referred for a magnetic resonance image (MRI) of her lumbar spine which demonstrated a satisfactory L5/S1 fusion. Disc desiccation and slight loss of height was noted at L4/5 but there was no evidence of any herniation. In March 2016, the patient had an MRI of both hips which revealed a moderate tear of the left gluteus medius tendon and left-sided trochanteric bursitis. Subsequently (between April and November 2016), the patient was referred for a series of ultrasound-guided corticosteroid injections into the left trochanteric bursa, which did not improve her symptoms. In June 2017, the surgeon offered to perform an iliotibial band release and excision of the trochanteric bursa. The patient decided not to undergo the procedure without first consulting another surgeon for a second opinion.

In February 2018, her new consultant referred her for a computerized tomography (CT) scan of her lumbar spine and an MRI of her left hip. The CT showed shallow, broad-based, central posterior disc bulges and degeneration at L3-L4 and L4-5 segments, with mild compression of the lumbar nerve root at both levels. The L5-S1 fusion was well preserved. The MRI of her left hip showed no evidence of intra or extra-articular pathology of the hip. Subsequently, her orthopedic surgeon gave her the option of having an extension of her fusion to include L4/L5. Given the unsatisfactory outcome following the initial operation, she declined this surgery and instead consulted the lead author (DT) requesting reassessment and another trial of conservative management.

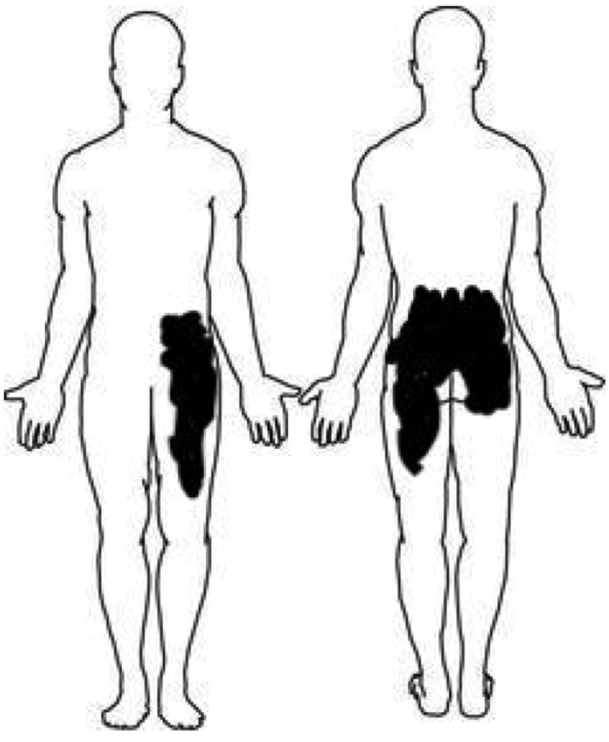

Figure 1. Original area of pain (2006).

Current history

The patient reported that her predominant pain was a constant 'heavy ache' in her low back and left thigh (see Figure 2). She reported that the back and thigh pain seemed to be concomitant, in that both were aggravated and eased together. She rated her pain on the NPRS as 5/10, as a constant baseline at rest, and 10/10 at worst. Her pain was aggravated by bending down to tie her shoes, sitting in a deep seat (>60 mins) or after prolonged driving (>30 mins).

She reported that her physical conditioning, mood and general well-being had all been significantly negatively impacted as a result of her pain. It was clear during this assessment, that there were a number of other factors that were likely to influence this patient, in both her engagement in treatment and her prognosis. This included her open dissatisfaction with her previous physiotherapy management (mainly massage and stretching) which only succeeded in providing short-lasting pain relief. In her view, she felt physiotherapists were 'afraid to touch' her spine because she had had back surgery. Additionally, she stated that she was 'afraid of causing further damage' and that she was unsure of what was 'good' and 'bad' for her back.

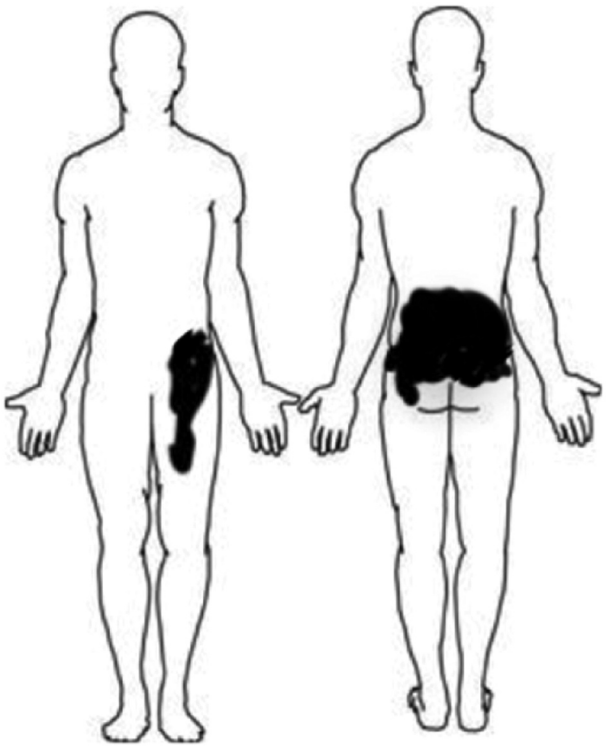

Figure 2. Current symptoms (2018).

Table 1. Outcome measures.

Outcome measure	Score
Numerical Pain Rating Scale at rest	5/10
Oswestry Disability Index	42%
Fear-Avoidance Beliefs Questionnaire	18/24

Based on these findings, the patient was asked to complete the Fear Avoidance Beliefs Questionnaire – Physical Activity subscale (FABQ – PA) to gain a deeper insight into her beliefs regarding pain and activity. She also completed the Oswestry Disability Index (ODI). Table 1. provides detail of her scoring with these tools. When asked her goals for treatment she said that she 'wanted someone to find out what was wrong', to 'do something' to her back and 'become stronger if possible'.

Physical examination

Observation of the patient's posture revealed an increased anterior pelvic tilt, increased lumbar lordosis, increased thoracic kyphosis and hypertrophied erector spinae. Both flexion and extension range of motion (ROM) were limited to less than 50% of normal, with the patient reporting both pain and apprehension when moving into these directions. She did not demonstrate centralization or a directional preference with repeated movement examination, performed in standing, following the McKenzie principles [21,22].

On neurological examination, the patient had a negative straight leg raise test (SLR) and equal sensation using sharp/blunt discrimination. The deep tendon reflexes of her lower limbs were brisk, equal and within normal ranges and neurodynamic testing did not reproduce any of her symptoms. The patient demonstrated decreased strength of the left hip flexors, abductors and extensors relative to the opposite side (Grade 4 vs Grade 5), using the Medical Research Council Manual Muscle Testing scale [23]. Sacroiliac joint (SIJ) pain provocation tests (thigh thrust, distraction and compression tests) as described by Laslett, Young, Aprill & McDonald (2003) did not reproduce the patient's symptoms [24]. The patient had full active and passive range of motion of her left hip and the Flexion Adduction Internal Rotation (FADDIR) test was negative, decreasing the likelihood of any intra-articular hip pathology [25]. Active spinal movement was stiff and guarded, in keeping with that of pain-associated functional behaviors [26]. Central posterior to anterior (PA) passive accessory intervertebral movements (PAVIM's) were performed in prone. Her symptoms of a diffuse ache in her lower back and left thigh were increased when these were applied to the L2, L3 and L4 segments. No significant hyper or hypomobility was detected.

Clinical impression

The subjective examination and response to the FABQ – PA suggested that this patient's beliefs and pain behaviors, lack of self-resilience and fear of movement may well have been augmenting her pain, disability and deconditioning [27,28]. It was also evident that the patient's expectations, in relation to treatment and management, had not been met. These findings suggested that giving her a better understanding of her spine's resilience, pain and its poor relationship to tissue damage might allow her to undertake a graded exercise program and create the possibility of reconceptualizing her maladaptive beliefs, whilst boosting self-efficacy [26,29,30].

The physical examination did not reveal a specific pathological cause (e.g. radiculopathy, symptomatic disc herniation) for her LBP. This opened an opportunity to show the patient that her spine was robust and that there was no need to fear a graded return to activity.

Rehabilitation

Over the following 12 weeks, a multimodal approach to management, based on the biopsychosocial model was employed [31]. This consisted of 12 'education,

manual therapy and exercise' sessions. An outline of each of these components is provided below.

Education component

At the beginning and end of each treatment session, time was set aside to explore and discuss the patient's understandings and beliefs about pain, the guidance provided by previous health professionals, and the role of exercise in her rehabilitation. These discussions revealed that the patient had a number of unhelpful perceptions that could be grouped as the following:

(1) A belief that there was 'something broken' and 'needs fixing'.
(2) A belief that her spine was fragile and lacked resilience.
(3) A belief that pain was equal to harm.

Clearly, she considered that pain was a measure of harm and that it should guide with respect to what she 'should' and 'shouldn't' do. Hence, education focused on three main concepts:

(1) Counseling the patient's previous experience with a 'curative' approach to pain based on a pathoanatomical source.
(2) Using resources to explain the neurophysiological and psychological mechanisms of manual therapy and the low biological plausibility of previously held concepts/theories such as correcting 'subluxations' etc.
(3) Exploring a 'management' approach based in the biopsychosocial model.

Reframing of the patients beliefs was challenging and required several sessions, and a variety of resources (see Appendix A). Table 2 provides further detail regarding the content of the education sessions and how they were integrated with the manual therapy and exercise components of her management.

Manual therapy component

During the subjective exam, the patient had described that she felt that therapists were 'afraid to touch' her spine because she had had spinal surgery. She was angry about this and expressed that a potentially useful modality (manual therapy) was not available to her. As a consequence of the education sessions (see Appendix A for specific examples of how the patient was educated on manual therapy aims), the patient reported feeling reassured and consented to manual therapy, understanding that it might modulate pain and give her confidence that her spine was capable of tolerating load. The patient was treated using graded PA central mobilizations to L2-L4 (Grades 1–4) for the first two sessions with the aims of building rapport, matching patient expectations, establishing non-irritability of tissue response and to reframe the patient's belief about pain through its modulation [32,33]. She tolerated the mobilizations well with no adverse reaction and reported decreased pain immediately post-treatment from 5/10 to 3/10 on the NPRS after visit 1, and from visit 3/10 to 2/10 on the NPRS after visit 2 suggesting positive within-treatment changes. This reduction of pain, after the second visit, was maintained for 4 weeks. However, the effectiveness of the intervention plateaued after visit 4 and the patient returned at visit 5 with pain rated at 4/10 NPRS. Given that mobilizations had provided pain relief and increased function, that was maintained for a number of days, and the patient's continued expression of her belief that 'something' needed 'to go' before she could improve, the therapist and patient agreed that a trial high-velocity thrust (HVT) was appropriate. The express aims of this intervention were to promote analgesia through neuromodulation, to meet the patient expectations regarding what treatment she felt was needed, to demonstrate to the patient the robustness and resilience of her spine and to create the opportunity of maximal engagement in her exercise program [32,34]. Following assessment for the warrant of a spinal manipulation (including a neurological assessment and tolerance of the pre-manipulation position), a rotation HVT directed at the L4 segment in side-lying was performed. The patient reported decreased pain to 2/10 on the NPRS immediately post-treatment. Interestingly, she also reported that her ability to tolerate the HVT made her feel that her spine was stronger than she initially thought. Her pain remained reduced at 2/10 NPRS from week 5 until the 12 week follow-up.

Exercise component

This element comprised a tailored, graded and progressive exercise program aimed at challenging the patient's fear avoidance behaviors toward fundamental human movements such as pushing, pulling, bending, squatting, etc. and improving the patient's physical capacity, and perceived capacity of her spine/surrounding tissues [35,36]. The initial session of the week was performed under the supervision of a physiotherapist, and two additional exercise sessions were performed by the patient at her local gym. The exercise component commenced by establishing a baseline which was tolerable and did not exacerbate pain levels above (5/10). From there, volume, intensity, and load were progressed as tolerated. The exercises were progressed by adding resistance and/or increasing the challenge of the

Table 2. Rehabilitation overview.

	Education	Manual Therapy	Exercise
Week 1	Counseling the patients previous experience NPRS = pre 5/10 post 3/10	PA central mobilizations to L2 L4 (Grades 1–2) NPRS = pre 5/10 post 3/10	Establishing baseline of exercise without flare up NPRS = pre 2/10 post 4/10
Week 2	Explaining mechanisms of manual therapy NPRS = pre 3/10 post 3/10	PA central mobilizations to L2-L4 (Grades 2–4) NPRS = pre 3/10 post 2/10	NPRS = pre 3/10 post 4/10
Week 3	Exploring attention/beliefs NPRS = pre 2/10 post 2/10	n/a	NPRS = pre 2/10 post 4/10
Week 4	Contextualizing delayed onset muscle soreness NPRS = pre 2/10 post 2/10	n/a	NPRS = pre 2/10 post 4/10
Week 5	Exploring a management approach based in biopsychosocial model NPRS = pre 4/10 post 3/10	Side-lying HVT to L4 NPRS = pre 4/10 post 2/10	NPRS = pre 2/10 post 4/10
Week 6	Education re: pain not equal to damage NPRS = pre 2/10 post 2/10	n/a	NPRS = pre 2/10 post 4/10
Week 7	Education of pain physiology NPRS = pre 2/10 post 2/10	n/a	NPRS = pre 2/10 post 5/10
Week 8	Revision of contextualizing delayed onset muscle soreness NPRS = pre 3/10 post 2/10	n/a	NPRS = pre 3/10 post 4/10
Week 9	Counseling the patients 'curative' approach to pain NPRS = pre 2/10 post 2/10	n/a	NPRS = pre 2/10 post 4/10
Week 10	Exploring a management approach based in biopsychosocial model NPRS = pre 2/10 post 2/10	n/a	NPRS = pre 2/10 post 4/10
Week 11	Exploring attention/beliefs NPRS = pre 2/10 post 2/10	n/a	NPRS = pre 2/10 post 4/10
Week 12	Counseling the patients previous experience NPRS = pre 3/10 post 2/10	n/a	NPRS = pre 2/10 post 4/10

Table 3. Exercise component with progressions in descending order from least challenging to most challenging.

Push	Pull	Hinge	Squat	Carry	Floor
Wall P.U.	Theraband Row	Box Lift	Wall Squat	Farmer's Walk	Heel Slides
Incline P.U.	Single Arm Row	Goodmorning	Prayer Squat	Horn Carry	Toe Taps
Kneeling P.U.	Lat Pulldown	Hip Thruster	Goblet Squat	Heartbeat Carry	Birddog
Shoulder Press	Bent Over Row	KB Deadlift	Bulgarian Squat	Suitcase Carry	Deadbug
P.U.	Ring Row	BB Deadlift	BB Back Squat	Waiter's Carry	T.G.U.

P.U.- Push Up, KB- Kettlebell, DB- Dumbbell, BB- Barbell, T.G.U.- Turkish Get Up.

task. The exercises were performed three times per week on nonconsecutive days.

A selection of the exercises and progressions can be seen in Table 3. A full description of the exercises and progressions can be seen in Appendix B.

Outcomes

Treatment outcome

At the end of 12-week intervention the patient's self-reported outcome scores had reduced from a baseline of 5/10 NPRS at rest, 42% ODI and 18/24 FABQ-PA to 2/10 NPRS at rest, 22% ODI and 4/24 FABQ-PA, respectively. These scores were maintained at the 12-week follow-up. The patient engaged with her targeted, tailored, graded exercise program 2–3 times per week and returned to running and cycling at moderate intensity (R.P.E = 6) 2–3 times per week.

Perhaps more importantly, the progress as seen with these outcome measures was reflected by comments made by the patient. She commented that her pain, fear and apprehension had decreased following manual therapy and that as a result of her deeper understanding of her pain and increased capacity, her tolerance of sitting positions had increased. She expressed that she was 'no longer a *slave* to her pain' and that pain was something she would 'work *with* instead of *against*'. She reported 'I still feel pain more than I would like and sometimes I overdo it … but knowing that my spine is strong and that I'm not causing myself further damage, has helped me massively'.

Discussion

This case study provides an example of how to successfully integrate manual therapy, pain education and a graded exercise program for patients with persistent pain following spinal surgery. Whilst it is not possible to ascertain which part of the program was most effective, the use of manual therapy, when applied through a biopsychosocial narrative, appeared to bolster both the pain education and exercise components, by demonstrating the resilience of the patient's spine, matching the patient's expectations, building therapeutic rapport and validating the patient's pain experience. This lead to a measurable improvement in function and enabled the patient to develop a sense of self-determination and autonomy.

Upon presentation, it was clear that the patient believed that there was a pathoanatomical basis to her problem. This appears to have been reinforced by the diagnoses and management she received from her surgeon, the diagnostic imaging she received as well as the previous physiotherapy she had had. This led to distress, and negative beliefs pertaining to her resilience, physical activity, and the integrity of her spine, which may have contributed to her pain and disability. Indeed, given the patient's initial FABQ-PA score, a screening tool such as The Keele Start Back Tool (SBT) would have been useful earlier in her care to assess for factors that may predict a poor outcome and may have helped indicate the patient's potential success [37]. It has been shown to be a useful tool to screen for psychological risk and can help indicate the role for psychologically informed treatment for low back pain patients [37]. Having had minimal success in her previous management it appeared that the patient was ready to accommodate a different understanding of her own body and her pain experience to help her through her rehabilitation.

Improving this patient's understanding of the neurobiology of pain, in particular, its poor relationship with the degree of tissue damage, provided the therapist the opportunity to de-emphasize the importance of an ongoing pain generator and to get the patient to explore how psychological and social factors influenced her pain. The success with this approach for this patient, supports the growing body of evidence that has demonstrated a beneficial effect of pain neuroscience education on function, pain, catastrophizing and physical ability in patients with chronic musculoskeletal pain [38–42]. A recent randomized control trial provides further evidence of the effectiveness of pain education in patients with CLBP [43]. In this study, pain education and a cognitive behavioral management approach were compared to a combination of manual therapy and exercise. The authors reported statistically superior outcomes in the pain education/behavioral group. What this study did not investigate was the effectiveness of manual therapy and exercise alongside pain education and behavioral management.

The current case study provides some support for such a combined approach. A novel aspect of this case study was the employment of manual therapy and manipulation to help a patient with persistent post-surgical pain. At face value, the use of such techniques may seem unwarranted in a patient with fear-avoidance behaviors, a belief that something was still 'broken' in her spine and that it was extremely fragile. However, we believe that manual therapy played a crucial role in addressing each of these issues. It was clear from talking to this patient that she wanted someone to 'do' something to her. She was angry that previous physiotherapists had been frightened to load her spine. Indeed, this approach strengthened her fear of movement and belief in the fragility of her spine. The judicious use of appropriately graded manual therapy techniques allowed the therapist to develop a rapport with this patient by validating her pain experience and presenting belief that something should be done to help her. Of note, the addition of controlled manipulative techniques helped demonstrate the physical resilience of her spine, in contrast to her fears about its vulnerability. This reflects the work of other authors who have suggested that pain education can be utilized in conjunction with manual therapy/manipulation to validate the patient's experience, decrease hypervigilance, and reassure the patient about the robustness of their system [34,36].

Current opinion proposes that the mechanical forces applied via manual therapy initiate a cascade of neurophysiological mechanisms [44]. These neurophysiological effects, alongside additional contextual factors such as patient expectations and improved therapeutic rapport, have been suggested as the main benefits of manual therapy [44,45]. The neurophysiological effects of manual therapy/manipulation were explained to the patient as part of the pain education component of her management (Appendix A). The success with manual therapy appeared to help demonstrate that her spine was much more resilient than she had initially believed. This created an opportunity to convey and implement this resilience through exercise.

Exercise modalities for chronic musculoskeletal pain that are applied using a biopsychosocial treatment approach and align with current pain management strategies have a higher potential to improve patient outcomes when compared to exercise alone [30,46]. Moreover, recent randomized controlled trials and systematic reviews of pain neuroscience education have reported that a combination of an exercise/manual therapy approach with pain education is superior in the reduction of pain when compared to an intervention of education alone [39,47]. During the program, the patient experienced transient increases in pain (See Table 2) which generally settled within 48 hours. Indeed, recent evidence has supported the use of painful exercise in helping to reconceptualize pain as non-threatnening, when delivered in conjunction clinical support [10,26]. Additionally, relating the exercises of the program to activities of daily living was very helpful for establishing relevance for the patient whilst counseling fear avoidance behaviors e.g a 'farmers walk' was likened to carrying rubbish bags (See Appendix B). Providing the patient with a license to move despite experiencing some symptoms and reassuring that it was safe to do soproved of primary importance to the exercise program [30].

Conclusion

The case study provides an example of how to apply the principles of a biopsychosocial approach in the management of a patient suffering from chronic post-operative spinal pain. The patient demonstrated improved self-reported and clinician reported outcome measures, following a psychologically informed multimodal rehabilitation approach, that incorporated manual therapy, pain neuroscience education, and exercise.

In particular, given the patient's expectations of treatment, manual therapy played an important role in developing the therapeutic alliance with the patient. Manual therapy also helped in demonstrating the variability of pain by establishing non-irritability and highlighting the robustness of the patient's system. This report details a promising application of manual therapy effectively and judiciously during a controversial time that has tempted clinicians to reconsider its use. However, the results of a single case report are not generalizable to a general population. Therefore, more research is needed to investigate the optimal dosing parameters associated with a successful multimodal approach.

Author contribution

Only the authors listed contributed to the article; there were no additional contributors.

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Notes on contributors

David Toomey received his Bachelor of Science Physiotherapy degree (Honours) from University College Dublin in 2012, prior to working in private practice and with high-performance sports teams for several years. He earned the designation of certified orthopedic manual therapist (COMPT) through the New Zealand Manipulative Physiotherapists Association (NZMPA) in 2017 before completing a Postgraduate Diploma in Health Science (Musculoskeletal Physiotherapy) in 2018. David is currently completing his clinical PhD through Auckland University of Technology in the area of exercise induced hypoalgesia (EIH) having been awarded an AUT Doctoral Scholarship. David is a Senior Physiotherapy Clinical Educator and Presenter for an online education company as well as being active in clinical practice on Waiheke Island, Auckland.

Duncan Reid is a Professor of Physiotherapy within the Faculty of Health and Environmental; Science, Auckland University of Technology. Duncan has had 38 years of clinical experience in Musculoskeletal and Sports Physiotherapy. His main areas of interest are in manual and manipulative therapy especially manipulation to the cervical spine, a topic he has taught both nationally and internationally. His research interests have also included sports injury incidence and prevention, sports related concussion, the management of knee injuries, and has completed his doctoral thesis investigating the effects of lower limb stretching interventions on patients with OA of the knee. He is a Fellow of the New Zealand College of Physiotherapy and a life member of NZMPA and Physiotherapy NZ. Duncan's experience in Sports Physiotherapy is also extensive. He has been a member of the Olympic and Commonwealth Games Medical team from 1988 until the Sydney Olympics in 2000 and was Chief Physiotherapist for the 1992, 1994 and 1996 Games. Duncan is the Physiotherapy Advisor for High Performance Sport NZ. He has over 300 peer review journal and book publications and is on the editorial panel of the journals Musculoskeletal Science and Practice, Manual and Manipulative Therapy and the Journal of Orthopaedic and Sports Physical Therapy.

Steven White is a physiotherapist and senior lecturer at Auckland University of Technology where he is the Paper Leader and lecturer for the postgraduate and undergraduate musculoskeletal physiotherapy papers. Prior to his academic appointment in 2003, Steve had 27 years' experience in his private practice managing patients with musculoskeletal pain. Throughout that time, he had a passion for teaching and since 1982 has tutored on the NZ Manipulative Physiotherapists Association continuing education program. Steve has also been invited to speak and run courses throughout New Zealand, in Australia and the USA. Steve's key area of interest is the diagnosis and management of musculoskeletal pain, with a particular emphasis on diagnostic accuracy and clinical reasoning. His PhD explored the diagnostic accuracy of the clinical examination for determining the presence of symptomatic intra-articular pathology of the hip. He is currently supervising a number of doctoral and master's students.

ORCID

Duncan Reid http://orcid.org/0000-0002-8989-800X
Steven White http://orcid.org/0000-0002-4305-7678

Ethics approval

Subject gave written informed consent.

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Appendix A.

Education Intervention

EDUCATION CONCEPT:	DETAILS:	RESOURCES:
Counselling the patient's previous experience with a "curative" approach to pain based on a pathoanatomical source.	• Listening to the patient's frustration with her lack of progress and management to date. • Validating the patients lived experience of pain. • Discussion regarding the disparity between diagnostic imaging findings and patient symptoms as supported by scientific evidence. • Reassuring the patient that her experienced pain is completely real even though the tissue may not be in danger.	**YouTube videos such as:** • Tame The Beast- It's time to rethink persistent pain (Tame The Beast, 2017). • TEDxAdelaide- Lormier Moseley- Why Things Hurt (TEDxTalks, 2011) • Understanding Pain In Less Than 5 Minutes (Evans,M., 2011). **Books such as:** • Painful Yarns. Metaphors and stories to help understand the biology of pain (Moseley, G.L., 2007). • Explain Pain (Butler D. Moseley, G.L., 2003). **Analogies such as:** • Pain being like a car alarm/ smoke alarm that can be over sensitive. • Drawing attention away from pain by focusing on something else, in a similar way to tuning into a different t.v. channel. • The role of expectation in treatment similar to someone expecting massage to be relaxing may likely feel it so. • How MT can be likened to "cracking your knuckles", in that that it is not dangerous or realigning your fingers, but may still feel nice.
EDUCATION CONCEPT 2: Using resources to explain the mechanisms of manual therapy, as well as how pain does not always equal damage.	• Explaining the neurophysiological + psychological mechanisms of manual therapy and the low biological plausibility of previously held theories such as "correcting subluxations" etc. • Understanding the biological process underpinning pain. • Understanding that pain can be overprotective. • Understanding the modulating ability of psychosocial factors both positively and negatively.	
EDUCATION CONCEPT 3: Exploring a "management" approach based in the biopsychosocial model.	• Using a journal to reflect on the contributing factors of "good" and "bad" days. • Identification of specific movements and tasks that the patient is apprehensive about and breaking them down into manageable parts. • The use of breathing and mindfulness techniques.	

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David Toomey @Physio2me

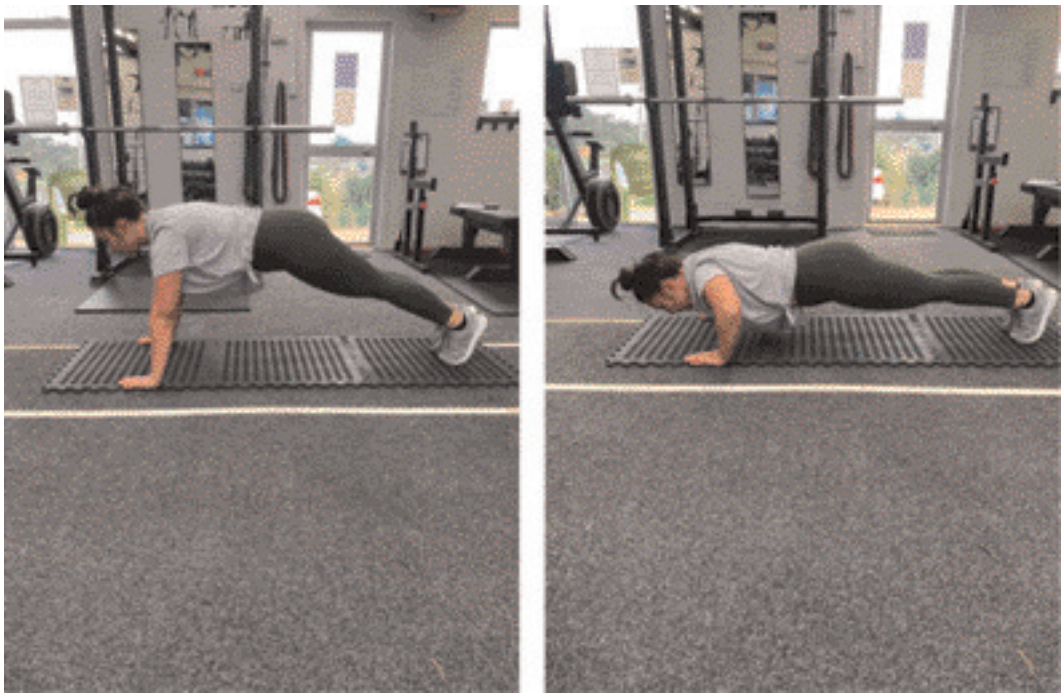
Appendix B.

Push Series Exercise 1: Wall Push Up

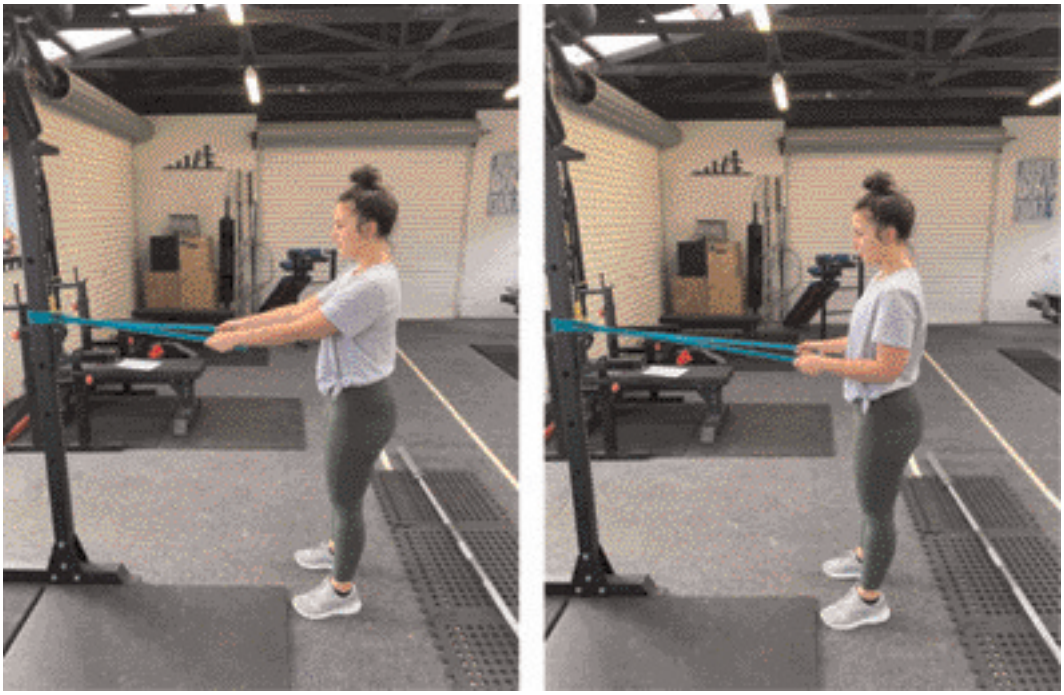
Push Series Exercise 2: Incline Push Up

Push Series Exercise 3: Kneeling Push Up

Push Series Exercise 4: Shoulder Press



Push Series Exercise 5: Push Up

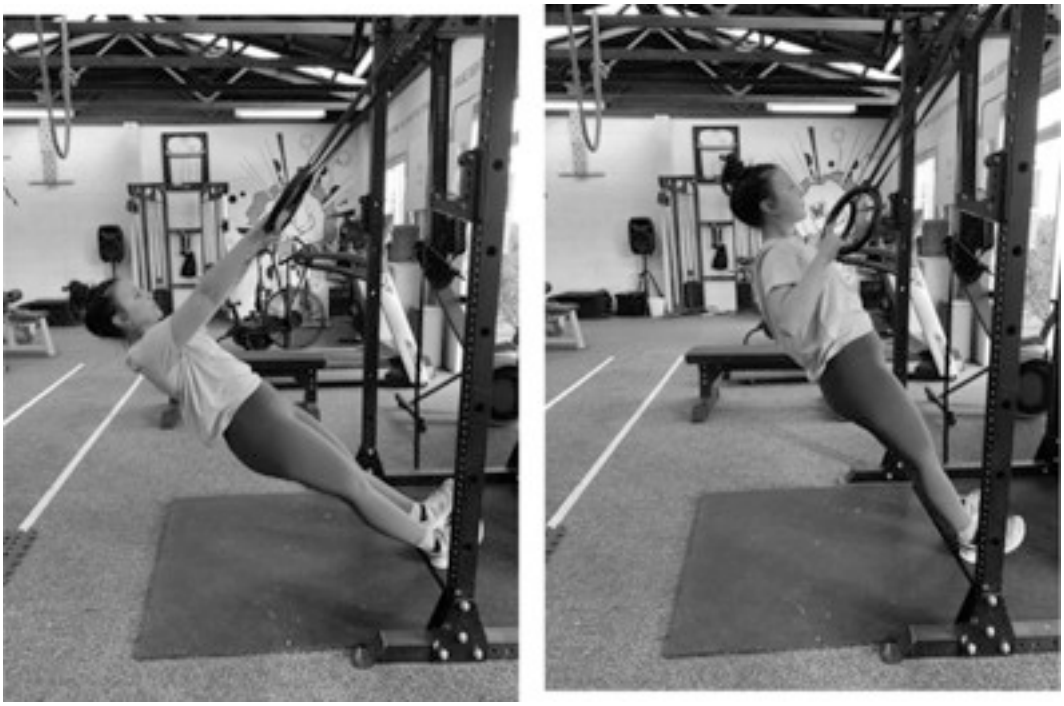


Pull Series Exercise 1: Theraband Row

Pull Series Exercise 2: Single Arm Row

Pull Series Exercise 3: Lat Pulldown

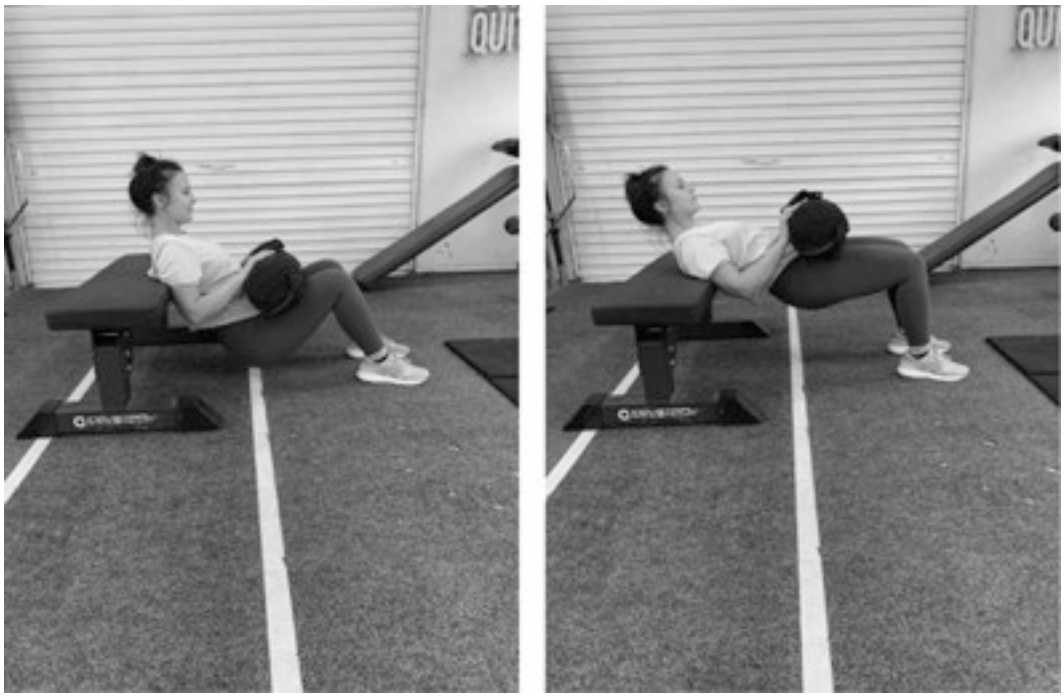
Pull Series Exercise 4: Bent Over Row



Pull Series Exercise 5: Ring Row

Hinge Series Exercise 1: Box Lift

Hinge Series Exercise 2: Goodmorning



Hinge Series Exercise 3: Hip Thruster

Hinge Series Exercise 4: Kettlebell Deadlift

Hinge Series Exercise 5: Barbell Deadlift

Squat Series Exercise 1: Swissball Wall Squat

Squat Series Exercise 2: Prayer Squat

Squat Series Exercise 3: Goblet Squat

Squat Series Exercise 4: Bulgarian Squat

Squat Series Exercise 5: Barbell Back Squat

Carry Series Exercise 1: Farmer's Walk

Carry Series Exercise 2: Horn Carry

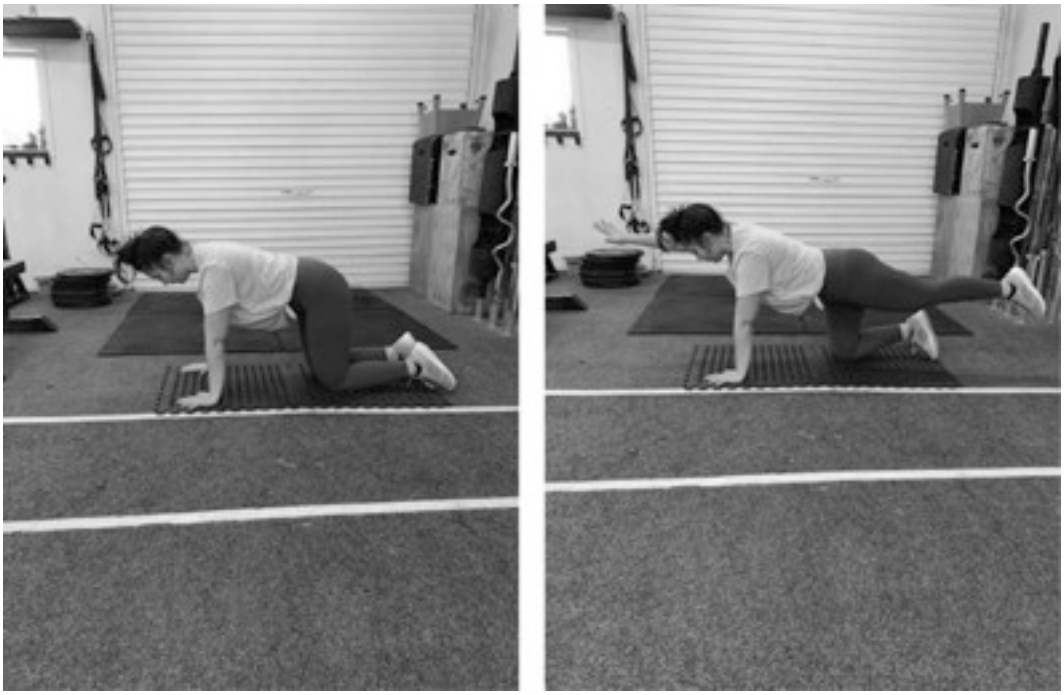
Carry Series Exercise 3: Heartbeat Carry

Carry Series Exercise 4: Suitcase Carry

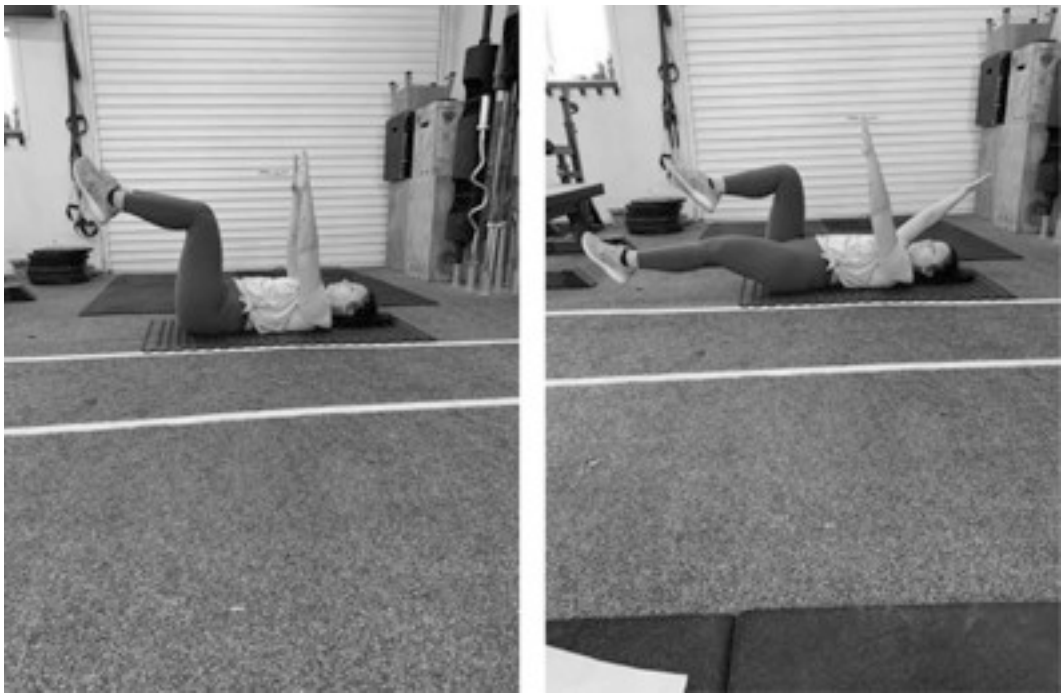
Carry Series Exercise 4: Waiter's Carry

Floor Series Exercise 1: Heel Slides

Floor Series Exercise 2: Toe Taps



Floor Series Exercise 3: Birddog



Floor Series Exercise 4: Deadbug

Floor Series Exercise 5: Turkish Get Up (Part (a) & (b))

Floor Series Exercise 5: Turkish Get Up (Part (c) & (d))

Floor Series Exercise 5: Turkish Get Up (Part (e) & (f))